

MATHEMATICS STANDARD ARTICULATED BY GRADE LEVEL

GRADE 7

Strand 1: Number Sense and Operations

Every student should understand and use all concepts and skills from the previous grade levels. The standards are designed so that new learning builds on preceding skills and are needed to learn new skills. Communication, Problem-solving, Reasoning & Proof, Connections, and Representation are the process standards that are embedded throughout the teaching and learning of mathematical strands.

Concept 1: Number Sense

Understand and apply numbers, ways of representing numbers, the relationships among numbers and different number systems.

- PO 1. Express fractions as terminating or repeating decimals.
- PO 2. Identify the greatest common factor for a set of whole numbers.
- PO 3. Determine the least common multiple for a set of whole numbers.
- PO 4. Choose the appropriate signed real number to represent a contextual situation.
- PO 5. Recognize the absolute value of a number used in contextual situations.
- PO 6. Locate integers on a number line.
- PO 7. Order integers.
- PO 8. Classify rational numbers as natural, whole, or integers.

Concept 2: Numerical Operations

Understand and apply numerical operations and their relationship to one another.

- PO 1. Add integers.
- PO 2. Subtract integers.
- PO 3. Select the grade-level appropriate operation to solve word problems.
- PO 4. Solve word problems using grade-level appropriate operations and numbers.
- PO 5. Multiply integers.
- PO 6. Divide integers.
- PO 7. Apply grade-level appropriate properties to assist in computation.
- PO 8. Apply the symbols + and – to represent positive and negative, and “| |” to represent absolute value.
- PO 9. Use grade-level appropriate mathematical terminology.
- PO 10. Calculate the percent of a given number.

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PO 11. Convert numbers expressed in standard notation to scientific notation and vice versa (positive exponents only).

PO 12. Simplify numerical expressions using the order of operations with grade- appropriate operations on number sets.

Concept 3: Estimation

Use estimation strategies reasonably and fluently.

PO 1. Solve grade-level appropriate problems using estimation.

PO 2. Use estimation to verify the reasonableness of a calculation (e.g., Is -2.5×18 about -50 ?).

PO 3. Determine whether an estimation of an area is approximately equal to the actual measure.

PO 4. Determine whether an estimation of an angle is approximately equal to the actual measure.

PO 5. Determine whether an estimation of the circumference of a circle is approximately equal to the actual measure.

PO 6. Verify the reasonableness of estimates made from calculator results within a contextual situation.

Strand 2: Data Analysis, Probability, and Discrete Mathematics

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Concept 1: Data Analysis (Statistics)

Understand and apply data collection, organization and representation to analyze and sort data.

PO 1. Formulate questions to collect data in contextual situations.

PO 2. Construct a circle graph with appropriate labels and title from organized data.

PO 3. Determine when it is appropriate to use histograms, line graphs, double bar graphs, and stem-and-leaf plots.

PO 4. Interpret data displays including histograms, stem-and-leaf plots, circle graphs, and double line graphs.

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| <p>PO 5. Answer questions based on data displays including histograms, stem-and-leaf plots, circle graphs, and double line graphs.</p> <p>PO 6. Find the mean, median, mode, and range of a given numerical data set.</p> <p>PO 7. Interpret trends from displayed data.</p> <p>PO 8. Compare trends in data related to the same investigation.</p> <p>PO 9. Solve contextual problems using histograms, line graphs of continuous data, double bar graphs, and stem-and-leaf plots.</p> |
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Concept 2: Probability

Understand and apply the basic concepts of probability.

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| <p>PO 1. Determine the probability that a specific event will occur in a single stage probability experiment (e.g., Find the probability of drawing a red marble from a bag with 3 red, 5 blue, and 9 black marbles.).</p> <p>PO 2. Compare probabilities to determine the fairness of a contextual situation (e.g. If John wins when two or greater shows after a six-sided number cube is rolled and Joaquin wins otherwise, is this a fair game?).</p> <p>PO 3. Predict the outcome of a grade-level appropriate probability experiment.</p> <p>PO 4. Record the data from performing a grade-level appropriate probability experiment.</p> <p>PO 5. Compare the outcome of an experiment to predictions made prior to performing the experiment.</p> <p>PO 6. Make predictions from the results of student-generated experiments using objects (e.g., coins, spinners, number cubes, cards).</p> <p>PO 7. Compare the results of two repetitions of the same grade-level appropriate probability experiment.</p> |
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Concept 3: Discrete Mathematics – Systematic Listing and Counting

Understand and demonstrate the systematic listing and counting of possible outcomes.

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| <p>PO 1. Determine all possible outcomes involving the combination of up to three sets of objects (e.g., How many outfits can be made with 3 pants, 2 tee shirts and 2 pairs of shoes?).</p> <p>PO 2. Determine all possible arrangements of a given set, using a systematic list, table, tree diagram, or other representation.</p> |
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Concept 4: Vertex-Edge Graphs

Understand and apply vertex-edge graphs.

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| <p>PO 1. Find the shortest circuit on a map that makes a tour of specified sites (vertex-edge graph).</p> |
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Strand 3: Patterns, Algebra, and Functions

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Concept 1: Patterns

Identify patterns and apply pattern recognition to reason mathematically.

PO 1. Communicate a grade-level appropriate recursive pattern, using symbols or numbers.

PO 2. Extend a grade-level appropriate recursive pattern.

PO 3. Solve grade-level appropriate recursive pattern problems.

Concept 2: Functions and Relationships

Describe and model functions and their relationships.

PO 1. Describe the rule used in a simple grade-level appropriate function (e.g., T-chart, input/output model).

Concept 3: Algebraic Representations

Represent and analyze mathematical situations and structures using algebraic representations.

PO 1. Evaluate an expression containing two variables by substituting integers for the variable (e.g., $7x + m$, when $x = -4$ and $m = 12$).

PO 2. Use variables in contextual situations.

PO 3. Translate a written sentence into a one-step, one-variable algebraic equation.

PO 4. Translate a sentence written in context into an algebraic equation involving one operation.

PO 5. Solve one-step equations using inverse operations with positive rational numbers (e.g., $\frac{2}{3}n = 6$).

Concept 4: Analysis of Change

Analyze change in a variable over time and in various contexts.

PO 1. Analyze change in various linear contextual situations.

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Strand 4: Geometry and Measurement

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Concept 1: Geometric Properties

Analyze the attributes and properties of 2- and 3- dimensional shapes and develop mathematical arguments about their relationships.

- PO 1. Draw a geometric figure showing specified properties (e.g., Draw an obtuse triangle.).
- PO 2. Classify 3-dimensional solids by their configuration and properties (e.g., parallelism, perpendicularity and congruency).
- PO 3. Identify the net (2-dimensional representation) that corresponds to a rectangular prism, cone, or cylinder.
- PO 4. Distinguish between length, area, and volume, using 2- and 3-dimensional geometric figures.
- PO 5. Draw polygons with appropriate labels.
- PO 6. Identify the angles created by two lines and a transversal.
- PO 7. Recognize the relationship between central angles and intercepted arcs.
- PO 8. Identify arcs and chords of a circle.
- PO 9. Model the triangle inequality theorem using manipulatives.
- PO 10. Identify corresponding parts of congruent polygons as congruent.

Concept 2: Transformation of Shapes

Apply spatial reasoning to create transformations and use symmetry to analyze mathematical situations.

- PO 1. Identify rotations about a point, using pictorial models.
- PO 2. Recognize simple single rotations, translations or reflections on a coordinate grid.

Concept 3: Coordinate Geometry

Specify and describe spatial relationships using coordinate geometry and other representational systems.

- PO 1. Graph data points in (x, y) form in any quadrant of a coordinate grid.
- PO 2. State the missing coordinate of a given figure in any quadrant of a coordinate grid using geometric properties (e.g., Find the coordinates of the missing vertex of a rectangle when two adjacent sides are drawn.).

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Concept 4: Measurement - Units of Measure - Geometric Objects

Understand and apply appropriate units of measure, measurement techniques, and formulas to determine measurements.

PO 1. Identify the appropriate unit of measure for the volume of an object (e.g., cubic inches or cubic cm).

PO 2. Measure to the appropriate degree of accuracy.

PO 3. Convert a measurement from U.S. customary to metric, and vice versa.

PO 4. Solve problems involving the circumference of a circle.

PO 5. Solve problems involving the area of a circle.

PO 6. Solve problems for the areas of parallelograms, triangles, and circles.

PO 7. Identify polygons having the same perimeter or area.

PO 8. Compare estimated to actual lengths based on scale drawings or maps.

Strand 5: Structure and Logic

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Concept 1: Algorithms and Algorithmic Thinking

Use reasoning to solve mathematical problems in contextual situations.

PO 1. Discriminate necessary information from unnecessary information in a given grade-level appropriate word problem.

PO 2. Analyze algorithms for computing with fractions.

Concept 2: Logic, Reasoning, Arguments, and Mathematical Proof

Evaluate situations, select problem-solving strategies, draw logical conclusions, develop and describe solutions and recognize their applications.

PO 1. Solve a logic problem using multiple variables.